In the Claims:

Kindly cancel claims 2-4 and 5-16 without prejudice and add the following claims.

1-16. (cancelled)

17. (new) A fuel cell system comprising:

i) at least one active membrane comprising a catalyst sandwiched between an anode layer and a cathode layer,

ii) a fuel supply having access to the anode layer,

iii) an air supply having access to the cathode layer for introducing air from the air supply to the fuel cell under pressure,

iv) the air functioning as an oxidant and as a coolant,

v) an air filter contained in a single fuel cell cathode side diffusion structure, and

vi) air penetrating ducts in the cathode layers to allow an airflow parallel to the membrane at a flow rate resulting in a stoichiometric rate in the range of 25 to 140.

18. (new) The fuel cell system of claim 17, wherein the stoichiometric rate is in the range between 45 and 90.

19. (new) The fuel cell system of claim 17, wherein the air flow direction within said fuel cell system is alternatingly reversible after periodic time spans.

20. (new) The fuel cell system of claim 17, wherein the air penetrating ducts are in an air conducting layer disposed adjacent to and in contact with the cathode layer for diffusion.

21. (new) The fuel cell system of claim 20, wherein the air penetrating ducts comprise channels in the cathode layer or in the air conducting layer, and wherein the channels extend along the air flow path.

22. (new) The fuel cell system of claim 21, wherein area of a channel section decreases along a flow direction.

23. (new) The fuel cell system of claim 17, further comprising a fuel cell stack having a parallelepiped geometrical form with a rectangular traverse section.

24. (new) The fuel cell system of claim 23, wherein the air penetrating ducts of the single cell are directed parallel to a short edge of the rectangle.

25. (new) The fuel cell system of claim 17, further comprising a fuel cell stack having a substantially cylindrical geometrical form and plural individual cells, each cell comprising an active area formed as a circular ring, the circular rings in the stack delimiting a central tube within the stack, wherein the air penetrating ducts spread from the central tube and direct the airflow radially through the individual cells.

26. (new) The fuel cell system of claim 25, wherein the fuel cell stack comprises one or two endplates, and wherein the air flow is generated by one or more blowers disposed by the one or two endplates of the fuel cell stack.

27. (new) The fuel cell system of claim 17, further comprising a fuel cell stack with gas separator plates between single fuel cells.

28. (new) The fuel cell system of claim 27, wherein the gas separator plates comprise a material having heat conductivity similar to that of the membrane.

29. (new) The fuel cell system of claim 27, wherein the gas separator plates comprise a foil material of expanded graphite.

30. (new) The fuel cell system of claim 27, wherein a ratio of heat conductivity of the material parallel to the membrane is > 0.04 W $m^2/(kg\ K)$.

31. (new) The fuel cell system of claim 17, wherein the air filter is a layer sheet of hydrophobic and porous material.

32. (new) The fuel cell system of claim 31, wherein the material is a porous stretched PTFE foil comprising an electrically conductive material.

33. (new) The fuel cell system of claim 32, wherein the PTFE foil is compressed and impregnated with a PTFE detergent suspension.

34. (new) A method for operating a fuel cell system comprising sandwiching at least one active membrane including a catalyst between an anode layer and a cathode layer, providing a fuel supply access to the anode layer and an air supply access to the cathode layer, introducing air via the air supply under pressure into the fuel cell system, passing the air along the cathode layer and exhausting the air from the fuel cell system, using the air as oxidant and as coolant, wherein the introducing the air into the fuel cell system comprises introducing the air

with a flow rate resulting in a stoichiometric rate in the range between 25 and 140, allowing an air flow parallel to the membrane at the flow rate resulting in the stoichiometric rate in the range between 25 and 140 through air penetrating ducts in the cathode layer(s) or a part of the cathode layers, forming channels in the cathode layer or in the air conducting layer as part of the air penetrating ducts, extending the channels along the air flow path, and decreasing area of the channel section along a flow direction.

35. (new) A method for operating a fuel cell system comprising sandwiching at least one active membrane including a catalyst between an anode layer and a cathode layer, providing a fuel supply access to the anode layer and an air supply access to the cathode layer, introducing air via the air supply under pressure into the fuel cell system, passing the air along the cathode layer and exhausting the air from the fuel cell system, using the air as oxidant and as coolant, disposing a fuel cell stack with gas separator plates between single fuel cells, wherein the material of the gas separator plates has a ratio of heat conductivity parallel to the membrane > 0.04 W m^2/(kg K), wherein the introducing the air into the fuel cell system comprises introducing the air with a flow rate resulting in a stoichiometric rate in the range between 25 and 140, allowing an air flow parallel to the membrane at the flow rate resulting in the stoichiometric rate in the range between 25 and 140 through air penetrating ducts in the cathode layer(s) or a part of the

cathode layers.

36. (new) A method for operating a fuel cell system comprising sandwiching at least one active membrane including a catalyst between an anode layer and a cathode layer, providing a fuel supply access to the anode layer and an air supply access to the cathode layer, introducing air via the air supply under pressure into the fuel cell system, passing the air along the cathode layer and exhausting the air from the fuel cell system, using the air as oxidant and as coolant, containing an air filter contained in a single fuel cell cathode side diffusion structure, wherein the introducing the air into the fuel cell system comprises introducing the air with a flow rate resulting in a stoichiometric rate in the range between 25 and 140, allowing an air flow parallel to the membrane at the flow rate resulting in the stoichiometric rate in the range between 25 and 140 through air penetrating ducts in the cathode layer(s) or a part of the cathode layers.

37. (new) A method for operating a fuel cell system, the fuel cell system comprising:

i) at least one active membrane comprising a catalyst sandwiched between an anode layer and a cathode layer,
ii) a fuel supply having access to the anode layer,
iii) an air supply having access to the cathode layer,
iv) an air filter contained in a single fuel cell cathode side diffusion structure,
v) air penetrating ducts in the cathode layers to allow an

airflow parallel to the membrane at a flow rate resulting in a stoichiometric rate in the range of 25 to 140;

wherein the method of operating the fuel cell includes the steps of

a) introducing air from the air supply to the fuel cell under pressure, and

b) using the air as both oxidant and coolant.